# Petr Stepanov

Materials science. Particle simulations and data analysis. Software development.

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> Ph.D. graduate in physics with expertise **materials science**, **gamma-ray spectroscopy**, **defect studies**, and nuclear phys

## Summary of Qualifications

* More than 7 years of experience in GUI desktop software development for experimental spectra fitting and interpretation (C++, ROOT,
* Strong materials science skills: defect characterization and porosity studies in bulk materials (with crystal structure and nano-pow
* Over 5 years of hands-on experience with data acquisition setups and numerous fast electronic modules (ORTEC, Canberra, Tektronix).
* Expertise with particle simulation software. Developed several simulation programs for applications in high-energy physics and photo

## Work Experience

### Research Collaborator (On-Site)

[Thomas Jefferson National Laboratory (JLab)](https://www.jlab.org/), Newport News, VA, USA.

Jul 2020 - Current

* Used Machine Learning (ML) TMVA framework to perform binary classification of thousands of signals from a data acquisition (DAQ) set
    * Applied CERN ROOT framework (C++) to perform statistical analysis of a significant amount (over 100 GB) of the raw exper
    * Utilized SLURM environment on [JLab supercomputer environment](https://scicomp.jlab.org/scicomp/index.html) to run resou
    * Proposed and implemented RAMDisk functionality on the development environment. This led to an over 60% increase in sourc
    * Set up data acquisition system that performs triggered waveform acquisition from Tektronix oscilloscope to a local Netwo
    * Committed 50+ shifts at the particle accelerator performing Target Operator and Shift Leader duties ([Pion LT project](h

### Postdoctoral Researcher (Remote)

[Catholic University of America (CUA)](https://www.catholic.edu/index.html), Washington, DC, USA.

Jul 2020 - Current

* Developed a computer simulation based on the Geant4 framework (C++, CMake, Eclipse IDE, gdb) to study the optical properties of a no
    * Program accounts on scintillation material properties - composition, transmittance, luminescence.
        * Code reconstructs detector response (PMT or MPPC) depending on the quantum efficiency curve.
        * Visualization of optical photon trajectories concerning their energy or creator process.
    * Teaching experience. Mentoring students within a 3-month Research Experiences for Undergraduates (REU) program at th
* Enhanced debugging of the core library source code led to the publishing of more than [10 bug reports](https://root-foru

### Research Assistant

[Bowling Green State University (BGSU)](https://www.bgsu.edu/), Bowling Green, OH, USA.

Aug 2014 - May 2020

* Assembled positron lifetime and Doppler spectrometers from ORTEC and Canberra (Mirion) fast electronic units. Utilized High-Purity G
    * Developed three open-source programs (C++, CERN ROOT) for a novel interpretation of the positron lifetime and Doppler ex
        * Derived and solved kinetic equations describing the formation and chemical reactions of e+ and Ps atoms in solids, l
            * Incorporated physical parameters (grain size, defect concentrations, rate constants) into custom models (PDFs wi
        * Above research allowed for estimation of defect concentrations and sizes in solids, classification of defect types (
    * Wrote a GUI application [LuminApp](https://github.com/petrstepanov/luminapp) (Java, Swing) to parse and merge time-stamp
    * Developed static website (Hexo, Gulp, Bootstrap) and visual identity for the [SelimLab](http://physics.bgsu.edu/selimlab

## Computer Science Skills

- **Essentials**. Git, SVN, SSH, Linux, and Terminal usage. BASH scripting. IDEs: Eclipse, Xcode, Visual Studio Code (VS Code).
- **Project management**. JIRA, Trello, GitHub, GitLab.
  - **Simulation and data analysis**: Geant4, CERN ROOT, MATLAB, Wolfram Mathematica, Maple.
  - **Academic writing**: LaTeX, MS Office Suite, Zotero.
  - **Data plotting**: Gnuplot, OriginLab, QtiPlot, SciDaVis, Grapher.
- **Desktop app development**. C/C++, GNU make, CMake. Frameworks: Qt, CERN ROOT, Geant4. Java and Swing. Python.
- **Frontend**: HTML, CSS (LESS and SASS), Bootstrap, responsive web design, JavaScript and jQuery, npm, gulp, AngularJS, React.js. Google Web Toolkit. PHP and WordPress themes development.

## Education

### Bowling Green State University (BGSU) • Ohio, USA

Aug 2014 - May 2020

Ph.D. in Photochemical Sciences • GPA 3.423. Novel developments in positron annihilation spectroscopy techniques—from experimental set

### Ohio Supercomputer Workshop • Ohio, USA

Jan 2017 - Feb 2017

Hands-on sessions in Supercomputer Essentials. Introduction to the key developments in the supercomputer field.

Featured Publications
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* P. S. Stepanov, F. A. Selim et al. Interaction of positronium with dissolved oxygen in liquids. *Physical Chemistry Chemical Physics

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* P. S. Stepanov, F. A. Selim et al. A model for joint processing of LT and CDB spectra of dielectric nano-sized powders. *AIP Confere
* P Saadatkia, P Stepanov et al. Photoconductivity of bulk SrTiO3single crystals at room temperature. *Materials Research Express* **2
* P.S. Stepanov, S.V. Stepanov et al. Developing New Routine for Processing Two-Dimensional Coincidence Doppler Energy Spectra and Eva
* J. Ji, A. M. Colosimo et al. ZnO Luminescence and scintillation studied via photoexcitation, X-ray excitation and gamma-induced posi
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## Professional Networks

- Discover my professional contacts on LinkedIn (200+ connections).
  - Get familiar with my scientific career on ResearchGate.
  - Skim through the list of my publications on Google Scholar (24 articles, 200+ citations).
  - Find examples of my code on GitHub (50+ repositories).

## Interests

Linux and open-source software. Hosting an open-source project for keyboard remapping on Linux (300 stars on GitHub).